LANL Medium Energy Physics Program Overview

Melynda Brooks, Team Leader

Outline:

- Synopsis of last MEP DOE review (2006)
- Response to review
- Personnel, Group Efforts, Funding Sources
- Our FWP proposed milestones
- Agenda for the day

Last MEP Review Report - May 2006

Group in Transition in May 2006:

- A number of senior staff had retired or left the group since previous review (Moss, Garvey, Peng, Barnes)
- 1.9 FTE Staff, 1.0 PD – Leitch, Liu, McGaughey, Butsyk (PD)
- Primary focus moved to RHIC spin program (but limited luminosity, polarization had been achieved) and cold nuclear matter studies at RHIC (one d+Au run in 2003)

Overall review of program: low-excellent

- *Quality, significance of scientific and technical accomplishments* – Excellent - PHENIX Muon arm contributions and FNAL experiments noted as significant accomplishments. RHIC spin limited to date.
- *Merit, feasibility, impact of proposed research* – Low-excellent – W program and d+A to search for gluon saturation good. Measuring J/ψ asymmetries not expected to produce significant results. The justification for the FVTX detector was not given (presentation was skipped).
- *Connection to ME National Research Program* – Low-excellent – major contribution is technical expertise; significant loss of senior scientists
- *Leadership, creativity, productivity of personnel* –Low-excellent –Leitch/Liu leadership roles noted, but loss of senior scientists had large impact

May 2006 - Present

Staffing changes:

- TSM Xiaodong Jiang hired
- Significant increase in post-doc levels through LDRD funded fellowships (see next)

Program evolution

- Better performance from RHIC in luminosity, polarization. Analyses moving to publication.
- Secured LDRD funding to provide muon identification detectors, and perform energy loss measurement using FNAL E906
- New effort at JLAB (Xiaodong and LDRD-funded post-doc)
- FVTX detector evolved to DOE-funded project. Underwent scientific and technical review by DOE, accompanied by many more simulations of performance.

Some Questions to Consider:

- What is the best balance of efforts in the next 3-5 years to have a strong scientific program, but given the (still modest) staffing levels and our need to provide hardware/service contributions that justify funding a national laboratory?
- What unique contributions do we/can we bring to our proposed program (technical expertise, laboratory resources, etc.)?
- How do we compare to other national laboratory efforts

Ranking against other MEP Labs

Brookhaven National Laboratory

- *Elke Caroline Aschenauer , Sasha Bazilevsky, Les Bland, Boris Morozov, Andrew Gordon, Akio Ogawa, Hiromi Okada*

Argonne National Laboratory

- *John Arrington, Kevin Bailey, Yun Ding, Donald Geesaman, Kawtar Hafidi, Roy Holt, Harold Jackson, James Johnson, Zheng-Tian Lu, Thomas O'Connor, David Potterveld, Paul Reimer, Patricia Solvignon, Ibrahim Sulai, William Trimble, Benjamin Zeidman*

Jefferson Laboratory

- *Large group*

PHENIX Team and MEP Personnel

Technical Staff Members (2.0 FTEs in FY09 supported by MEP):

Melynda Brooks, **Xiaodong Jiang**, Jon Kapustinsky, Gerd Kunde, David Lee, **Mike Leitch, Ming-Xiong Liu**, Pat McGaughey, Walt Sondheim, Hubert vanHecke

LDRD-supported Staff and Post-Docs (0.4 FTE Staff, 2.0 FTE Post-Doc):

Ming Liu (25%), Pat McGaughey (15%), Christine Aidala (100%), Andrew Puckett (100%)

Post-Docs (1 FTE on KB01 in FY09) :

Lei Guo, **Han Liu,** Catherine Silvestre, Zhengyun You

Students and Full-Time Visitors:

Hisham Albataineh (NMSU, recently graduated), Husseing Al'Taani (NMSU, now at BNL) Hugo Pereira (staff, Saclay), Xiaorong Wang (NMSU staff)

2.0 FTE Staff + 1.0 FTE PD on DOE funds

0.4 FTE Staff + 2.0 FTE Post-Docs on LDRD funds

***Bold-face indicates primary contributors to MEP work**

Funds Supporting PHENIX Team Efforts

DOE Supported Efforts

Medium Energy Physics - RHIC Spin and Cold Nuclear Matter, JLAB $1000k/FY09
FVTX (Project Management, Mechanical, DAQ, Readout Chip and Sensor Oversight)
VTX (construction funds for Walt Sondheim)
PHENIX Muon Tracker - continued maintenance, expert shifts, etc.

LDRD-Supported Efforts

The First Precise Determination of Quark Energy Loss in Nuclei (FNAL E906)
2008-2010 $250k/year
Christine Aidala, Frederick Reines Post-Doc, *"Measurement of Transverse Single-Spin Asymmetries of Neutral Pion and Eta Meson Production in Polarized p+p Collisions Using the PHENIX Detector at RHIC"*
2009-2011 $180k/year
Andrew Puckett, Director's funded Post-Doc, *Experimental Studies On the Origin of Nucleon Spin)*
2009-2010 $125k/year

FY09 FWP Milestones

- Complete the J/ψ analysis and interpretation of the new 2008 d+Au data
- Extract the first clean ϒ measurement at forward rapidity and work towards quantifying the ψ' and ϕ signals.
- Improve the muon tracker momentum resolution performance
- Improve the reliability and understanding of the muon detector performance in order to reduce systematical uncertainties in all muon measurements.
- Study high p_T muon background from run9 500GeV p+p collisions
- Heavy quark A_N: Complete and publish our first dimuon J/psi transverse single spin asymmetry measurement from Run 6 data set.
- Study A_N in the very forward region with ZDC/FCAL/MPC/Muon to investigate transverse quark and gluon distributions and their connection to orbital angular momentum.
- Study charged, correlated, back-to-back di-hadron production and test the QCD factorization in longitudinally polarized p+p
- Continue to work with theorists to understand extrapolation of polarized parton distributions.
- Continue leading the FVTX detector effort and deliver the silicon sensors, silicon readout chips, and readout electronics needed for the FVTX detector..
- Participate in experiment E906, supported by our LDRD grant, to provide muon identifier and understand partonic energy loss in cold nuclear matter.
- Complete JLAB Neutron Transversity analysis, obtain final results by end-of FY10.
- Have a group of approved JLab-12 GeV experiments by FY11-FY12.

Agenda

8:55	Overview - Physics, Key Roles, 5-year Plan	Mike Leitch (25+10)
9:30	Cold Nuclear Matter (CNM) Physics	Mike Leitch (15+10)
9:55	E906 & CNM Energy Loss	Pat McGaughey (10+5)
10:10	Break	
10:30	RHIC Spin	Ming Liu (20+10)
11:00	Transverse Spin & SIDIS at Jlab	Xiaodong Jiang (15+10)
11:25	Future Physics at Jlab	Andrew Puckett (10+5)
11:40	Electron Ion Collider - Christine Aidala	Christine Aidala(15+5)

12:00 ➔ Lunch, executive session, closeout